

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

SCARPA et al

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Title: CONVERGENT SPRAY GUN CAPABLE OF BEING HAND-HELD

Commissioner of Patents & Trademarks  
Washington, DC 20231

Date: August 22, 2001

Docket No.: N800/ST-108

Examiner: KIM, C

Art Unit: 3752



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**REVISED APPEAL BRIEF**

This is an appeal of the Examiner's Final rejection of claims 1 through 7, (Paper No. 6).

**Real Party of Interest**

The real party of interest is United Technologies Corporation of Hartford, Connecticut who is the owner of the subsidiary USBI Co. of Huntsville, Alabama, the assignee of the invention.

**Status of Claims:**

Claims 1 through 7 stand rejected under 35 U.S.C. § 112, first paragraph on the grounds that the specification did not support the inventive limitation "said fluid tip including a circular shaped member abutting the inner surface of said air cap". (see Claim 1) (Air cap should read "the outer concentric tube of said double concentric tube"). Claims 1 through 7 were twice rejected. Claims 1 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Black, claims 2 and 4 was

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rejected under the same statute as being unpatentable over Black in view of Schowiak, claim 6 was rejected under the same statute as being unpatentable over Black in view of Schowiak and further in view of Warren and claim 7 was rejected under the same statute as being unpatentable over Black in view of Schowiak and Warren and further in view of Breitsprecher.

**Status of Amendments:**

A proposed amendment amending the drawings was submitted and was not entered. Upon the decision from the Board, this requirement will be satisfied.

An Advisory Action was issued and indicated that the limitation in the claims is not supported by the specification.

**Summary of invention:**

This invention relates to a convergent spray gun that is used for spraying coatings on items like the outer surfaces of the space shuttle and other outer space vehicles. The spray gun of this invention is in a class of spray guns that has become known in the industry as convergent spray guns because the plume of atomized resin egressing from the gun forms a convergent pattern. A resin, either a one part or a two part resin flows through a central orifice, air is injected adjacent this orifice to form the atomized convergent plume and the filler material added to the resin is admitted into the plume at the discharge orifice at a specific location therein. These types of spray guns heretofore were made to fit a robot that is programmed by a computer (standard PC computer) to follow a specific pattern for spraying onto the substrate. These types of guns are large and heavy and are not conducive to be held in the hand of an operator.

This invention is the convergent spray gun that is for the same use as the heretofore known convergent spray guns, but miniaturized to allow an operator to hold the gun in one hand during operation. (As used herein, the term hand held indicates that the gun can be held in one hand during operation). It is pointed out that merely making the components smaller does not provide a suitable gun and hence, a suitable convergent spray gun requires much more ingenuity than making the components smaller. The invention is shown in two different embodiments that serve the same function, where one of the embodiments includes a paddle mixer mounted in the gun per se, and the other embodiment includes the mixer mounted externally of the gun. However, the "guts" of the gun in both embodiments are substantially the same.

It is not typical that by adding components the overall mechanism is made smaller and lighter. In this instance, the adding of certain components, as will be described in more detail hereinbelow, permitted the reduction in size of the other components, resulting in a smaller, lighter weight convergent spray gun. This reduction in size and weight permitted the gun to be hand held when being operated.

The spray gun 10 is shown in the pistol configuration in Fig. 1 and consist of the handle 17, the trigger 30, the air inlet 21, the concentric tube assembly 16, the dry powder inlet 22 and the resin inlet 38 and air cap 90. As best seen in Fig. 3 the resin flows through the central passageway 80 into the fluid tip element 70. The fluid tip element 70 is essential to the gun as it is this additional element that allows the other components to be reduced in size or miniaturized. The fluid tip element 70 includes a circular shaped passage in cross section that allows the flow of resin through the center thereof which ultimately flows through the central orifice 26. The fluid tip element includes a circular shaped main body 78 whose outer diameter is substantially the same as the inner diameter of the

concentric tube 46 and a portion of the inner diameter of the air cap 90. When assembled the outer diameter surface of the main body 78 bears against the inner diameter of the concentric tube 46 and a portion of the inner diameter of the air cap and blocks the flow in passage 66. Hence, without more the air in passage 66 would not flow to the orifice 26. According to this invention the outer diameter of the main body 78 includes flats formed thereon which allows the flow of air from passage 66 through the gap defined by the flats into the air cap 90. The dimensions and configuration of these components are selected to assure that the resin exiting orifice 26 is in the form of a convergent spray; namely the plume is constricted at one point and then forms a convergent flow.. The air cap 90 (see Fig. 4) includes a pair of diametrically opposed inlets 110 and 112 that flow the dry powder into an annular space or manifold 116 formed in the air cap 90 where it is injected through the outlet 122 into the low pressure location of the plume of the convergent spray exiting orifice 26.

As mentioned earlier, the inclusion of the fluid tip element 70 with its distinctive configuration and the air cap combination permitted the reduction in the other components so as to miniaturize the gun. It will be appreciated that in Fig. 1 embodiment the resin, which is a two part composition, is premixed before entering the gun. The embodiment in Fig. 8 includes a paddle mixer 166 where the resin components are mixed within the gun per se. The fluid tip element and air cap are identical to the elements depicted in Fig. 1.

The embodiment depicted in Figs. 8 and 9 is configured similar to the shape of the convergent spray gun that is typically used with robotics. In this embodiment the mixing of the 2-part resin is done in the gun itself by utilizing a paddle mixer. All the other components are substantially the same as the components in the embodiment depicted in Fig. 1. Again, as discussed in the above, the convergent spray gun depicted in Fig. 8 is miniaturize and capable of being hand held.

Miniaturized convergent spray guns are relatively new to this technology and need to be distinguished from the ordinary spray gun that is typically used in spraying paint and the like. The convergent spray gun includes mechanism to produce an atomized spray that mixes with the resin emitted through the center of the gun and forms a convergent plume exiting the gun. Typically, a filler is inserted into the plume from a passage formed on the outer periphery of the gun so that the filler does not mix with the resin until both leave the gun. Fig. 6A is exemplary of the typical schematic illustration of the convergent gun where the resin is conducted through the central passage 200 and the air is flown through annular passages 206 and discharges through the annular port 210 in such a manner as to atomize the resin discharging through the central orifice 202.

Typical of these convergent spray guns is that they are basically controlled by a computer and associated motors and valves that assure that the proper mixture of ingredients are delivered to the nozzle of the gun before the mixture is emitted from the gun so as to assure that the correct composition of material is applied to the substrate. This convergent gun includes a shut-off valve that permits the operator to stop the spray at will notwithstanding the computer and associated motor and valves are in the operating position. This is merely a temporary shut-off valve since the ingredients captured in the gun will cure in time and harden and render the gun unusable. It is not a metering valve as is shown in the prior art.

**Issues:**

- 1) Are claims 1 and 4 unpatentable under 35 U.S.C. § 103(c) in light of Black U. S 3,185,396?
- 2) Are claims 2 and 4 unpatentable under 35 U.S.C. § 103(c) in light of Black

U. S 3,185,396 in view of Breitsprecher U. S. 5,419,491?

- 3) Is claim 5 unpatentable under 35 U.S.C. § 103(c) in light of Black U. S 3,185,396 in view of Schowiak 4,005,825?
- 4) Is claim 6 unpatentable under 35 U.S.C. § 103(c) in light of Black U. S 3,185,396 in view of Schowiak 4,005,825 and further in view of Warren?
- 5) Is claim 7 unpatentable under 35 U.S.C. § 103(c) in light of Black U. S. 3,185,396 in view of Scowiak U. S. 4,005,825 and Warren U.S. 5,645,217, and further in view of Breitsprecher U. S. 5,419,491?
- 3) Are claims 1 through 7 unpatentable under 35 U.S.C. § 112, first paragraph in light for failure to support the configuration of the fluid tip assembly element recited in claim 1?

#### **Grouping of Claims**

Claims 1 through 7 stand and fall together so that if any one of the claims is deemed unpatentable then they all are unpatentable.

#### **Argument That Claims 1 and 4 Are Patentable Over Black 3,185,396 and Are in Compliance with 35 U.S.C. § 103(c)**

The Examiner relied extensively on the Black reference and suggest that Black discloses a spray gun that essentially includes all of the elements of claim 1 except for the flats on the circular shaped member. It is submitted that the Examiner missed the whole point of the fluid tip element. The Examiner is apparently under the impression that the purpose of the "flats" in applicants structure is to accommodate a wrench. The flats are, indeed, not used to "accommodate a wrench". As mentioned

with respect to the description of the invention, the flats define passages between the outer diameter of the main body 78 and the adjacent wall of the concentric passage to provide an opening that allows the air to flow into the resin stream, and thereby atomizing the liquid resin. The inclusion of this fluid tip element into the gun enabled the inventors to miniaturize the gun which is what is believed to be unique with respect to the heretofore known guns.

Moreover, it is submitted that the gun of Black is entirely different than the claimed invention. It is interesting to note that Black on column 1, lines 44-49 states what he believes to be the essential feature of his invention and for the sake of convenience to the Board this portion of the specification is quoted below:

“The essential concept of this invention involves a plurality of tubular elements arranged one within the other through which viscous and solid substances are pressurized for discharge from the end of the outer element as an integrated mixture for impingement onto a surface requiring a protective coating.”

The teachings of Black is, indeed, contrary to the substance of the present invention. As mentioned earlier, applicants' structure is such that the viscous (wet resin) and the dry filler do not commingle within the gun, but rather they are mixed only after the resin is discharged from the gun. Hence, it is neither understood nor comprehended how the examiner can conclude that the two guns are the same or substantially the same. Also as pointed out in the description of this invention, the dry filler is introduced in the plume of the air/wet resin discharging from the central orifice of the gun into the low pressure zone of the plume, a feature that is not taught or suggested in the Black reference.

The outer tube 11 of Black extends to the end of the gun. The Applicants' convergent gun, on the other hand, eject the solid filler material outside the gun and downstream of the central orifice discharging the resin.

The Examiner acknowledges that Black does not teach using the fluid tip 70. On this we agree! Notwithstanding that the Examiner is under the erroneous impression that the flats on the tip are for accommodating a tool, even assuming that were the case, which is horrendously in error, it is difficult to comprehend how a fluid tip can be accommodated in the structure taught by Black and for that matter what purpose would it serve. Apparently, it is the Examiner's position that with the fluid tip installed in the Black structure, Black's entire structure could then be made smaller. That is to say that Black would be able to make the gun with a single handle so that the operator can operate it with one hand. It is believed this interpretation of Black's teachings and the purported combination is horrendously wrong.

**Argument That Claims 2 and 3 Are Patentable Over Black 3,185,396 in View of Breitsprecher and Are in Compliance with 35 U.S.C. § 103(a)**

The Examiner has misinterpreted the Breitsprecher reference or is making out of it something that was never intended by the patentee. The Examiner suggests that it would be obvious to a skilled artisan to utilize the diametrically opposed passages 46 and 47 of to Breitsprecher promote "uniform addition of dry powder". The diametrically opposed passages being relied on by the Examiner do not flow dry powder but rather flow air in order to atomize the liquid discharging from the central orifice. The cited reference does not and cannot, it is believed, be combined with Black to inject dry powder and for that matter the cited reference never intended, nor does it show nor suggest that the diametrically opposed passages 46 and 47 are for transmitting dry powder. As a matter of fact, it is



believed that the gun of Breitsprecher is to mix an adhesive and catalyst.

Furthermore, the plume from the Breitsprecher's gun is designed to form a stream that is fan shaped and not in a convergent spray as is the case of the present invention. As noted above, the present invention is for a convergent nozzle where the dry powder is injected into the plume at the low pressure area where the spray transforms from a convergent configuration to a divergent configuration. Nothing remotely like this is disclosed in the references relied on by the Examiner.

**Argument That Claim 5 Is Patentable Over Black 3,185,396 in View of Schowiak 4,005,825 and Is in Compliance with 35 U.S.C. § 103(a)**

Applicants do not predicate patentability on the fact that the apparatus includes a receiving box, but does contend that the combination with the other elements are new and unobvious.

**Argument That Claim 6 Is Patentable Over Black 3,185,396 in View of Schowiak 4,005,825 and Further in View of Warren 5,645, 217 and Is in Compliance with 35 U.S.C. § 103(a)**

Applicant suggest that if claims 1 and/or 4 are patentable, the dependent claim is likewise patentable and agree with Examiner that the mixer/manifold do not breathe patentability into the claim.

**Argument That Claim 7 Is Patentable Over Black 3,185,396 in View of Schowiak 4,005,825 and Warren 5,645, 217 and Further in View of Is in Compliance with 35 U.S.C. § 103(a)**

Applicants do not disagree with the Examiner on this point.

**The claims 1-7 patentably distinguish over the cited references.**

It is respectfully submitted that absent from the prior art relied on by the Examiner are the following elements appearing in claim 1.

1) "an air cap mounted over said fluid tip and defining with said fluid tip an air nozzle for flowing air into said resin stream discharging from said central orifice and defining an atomized convergent spray having a low pressure zone...";

2) "a dry powdered nozzle having angled flow passages for directing dry powder into the low pressure zone..."; and

3) "said fluid tip including a circular shaped member abutting the inner surfaces of said air cap and having flats formed thereon to define gaps between said air cap and said circular shaped member to allow air from said concentric passage to flow there between..."

**The Fluid Tip Element Is Adequately Described in the Specification and Is in Compliance with 35 § 112, first paragraph**

On page 15, line 3 et sequa, applicants describe the fluid tip as follows:

"The fluid tip element 70 includes a main body 78 which is circular in cross section and is dimensioned so that its diameter is substantially equal to the inner diameter of the tubular portion 46 and several (up to 4) segments or secants to the circular cross section are milled our cut at the larger diameter portion 80 to form flats that leave a gap between the fluid tip element 70 and the annular passage 66 (See Fig. 3). This gap serves to meter, direct and atomize the air in the annular passage."

The next portion of the description discusses the air cap 90 which surrounds the fluid tip. While the portion of the fluid tip abuts the inner surface of the air cap, applicants propose to amend claim 1 so that it is clear that the main body 78 engages the inner surface of the tubular portion 46. It is not

believe that there is any justification for the Examiner to reject this claim on § 112 rejection and that the description is in full compliance with the statute.

### Conclusion

By way of summary and conclusion it is respectfully submitted that the Black reference is not pertinent that by any stretch of the imagination can it be considered a miniaturized convergent spray gun. As understood the term as used in the industry, the Black structure is not considered a convergent spray gun. There is no teachings directly or indirectly in Black that would lead one ordinary skilled in this art to arrive at a miniaturize convergent spray gun that is capable of being held in one hand by the operator during operation. There is no suggestion anywhere in the prior art that by adding a fluid tip the overall gun can be made smaller.

In addition, at least to applicant, that after having read the patent application, the Examiner has attempted to reject all the claims by applying elements located in different prior art patents and applied them in a piece-meal fashion, which is a process not sanctioned by the PTO. As noted in *Orthopedic Equip. Co. V. United States*, 217 USPQ 193, 199 (Fed.Cir. 1983) and upheld in *Monarch Knitting Machinery Corp. V. Sulzer Morat GmbH* (CAFC) 45 USPQ2nd 1977 it is wrong to use the patent application as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the desired results. The real question to be answered is whether the references relied on by the Examiner acknowledged the invention and the solution to the problem and whether this prior art contains a suggestion or motivation to combine these references. It is respectfully submitted that the answer to this inquiry is in the negative. It is earnestly submitted that the combinations of these elements as claimed patentably distinguishes over the art taken singularly or collectively and there is neither a suggestion nor motivation expressed in this prior art that would


render applicant's invention obvious.

Moreover, the rejection of claims 1 through 7 on § 112 is inappropriate and that the claim as it now reads is in compliance with this statute and it is further believed that the term "fluid tip" is adequately defined in the specification and one would have no problem in understanding the limitations of this term..

It is respectfully requested that the Examiner be reversed and these claims be allowed.

Respectfully submitted,

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## APPENDIX

1. A portable convergent miniaturized spray gun including a handle, said spray gun having a central passage for flowing liquid resin and a concentric passage relative to the central passage for flowing pressurized air, and a nozzle internal of said spray gun for discharging the liquid resin from the central passage, a double concentric tube assembly having an additional central passage in axial alignment with said central passage for receiving resin from said internal nozzle, an additional concentric passage relative to said central passage in axial alignment with said concentric passage, a fluid tip mounted on the end of said additional central passage defining a central orifice for discharging the resin flowing from said central passage and said additional central passage, an air cap mounted over said fluid tip and defining with said fluid tip an air nozzle for flowing air into said resin stream discharging from said central orifice and defining an atomized convergent spray having a low pressure zone, said fluid tip including a circular shaped member abutting the inner surface of said air cap and having flats formed thereon to define gaps between said cap and said circular shaped member to allow air from said concentric passage to flow there between and mix with the resin to atomize the resin flowing out of said central passage and a dry powdered nozzle having angled flow passages for directing dry powder into the low pressure zone of said atomized convergent spray.

2. A portable convergent miniaturized spray gun as claimed in claim 1 including a sleeve surrounding said double concentric tube assembly and defining a manifold, said dry powdered nozzle including diametrically opposed passages disposed relative to said additional central passage communicating with said manifold for leading dry powder from said diametrically opposed passages to the orifice formed on the end of said dry powdered nozzle and directing said dry powder to the low

pressure zone.

3. A portable convergent miniaturized spray gun as claimed in claim 1 wherein said dry powdered nozzle including diametrically opposed passages disposed relative to said additional central passage for directing said dry powder directly into the low pressure zone.
4. A portable convergent miniaturized spray gun as claimed in claim 1 wherein said spray gun including a main body, said main body being L-shaped.
5. A portable convergent miniaturized spray gun as claimed in claim 4 including a receiving box attached to said handle for receiving the dry powder and low pressure air for directing said powder into said diametrically opposed passages.
6. A portable convergent miniaturized spray gun as claimed in claim 5 including a mixer disposed upstream of said main body, a source of resin and a source of catalyst, a manifold, connection means for interconnecting said manifold with said source of resin and said source of catalyst to said mixer and a hose interconnecting said mixer with said spray gun.
7. A portable convergent miniaturized spray gun as claimed in claim 6 including a valve operatively connected to said additional central passage for flowing and stopping the flow of said resin.